Forrest Gump *and* Safety Investigations

By Cdr. Dave Bean

Investigating a mishap can be a bit like Forrest Gump's box of chocolates: You never know what you'll get. For example, take a recent refueling mishap by one of our helicopter crews.

Two days before a major afloat exercise, I received an early evening call, telling me a simple evolution had ended with a ruptured fuel cell in one of our HH-60H aircraft—a low-density, high-demand airframe. The minor fuel spill was contained, and nobody was hurt, but damage to the cell appeared significant. Surely this mishap would be attributable to something other than human factors, I thought; our qualified crew was following directions to the letter and could not have caused the mishap. The investigation turned up some interesting data for our helo community.

Several line-division personnel, each a qualified plane captain, had refueled the aircraft in preparation for a flight to the ship two days later. All appropriate, traditional, safety measures were taken to ensure a smooth evolution: An adequate number of personnel, properly trained, followed approved checklist procedures. As the fuel cells neared capacity, the refuel crew heard a distinct bang and saw fuel leaking from the drain vents underneath the fuselage. Coincident with the noise, the maintainer handling the hose saw an immediate jump in cell pressure on the refueling-panel gauge. Fueling was stopped, and the investigation began.

As I initially had expected and hoped, the mishap investigation found a serious material flaw that led to this ground mishap. The proximate causal factor was a failed T-fitting in the main fuel-cell plumbing, which caused a malfunction of the system's high-level, shutoff-safety feature. Without that shutoff capability, the cell continued to fill with fuel, until it literally burst out of the Kevlar box surrounding it.

A unique set of circumstances had combined to cause the mishap, despite the ground crew's close adherence to written procedures. Perhaps, the more interesting find was the deficient checklist employed by the maintainers during the refueling procedure.

In the HH-60H, the digital fuel gauge and the fuel tableau on the control-display unit display fuel quantity in pounds. However, the checklist used by all HS maintenance personnel to fuel aircraft provides only fuel-tank capacity in gallons. We have little guidance regarding the symptoms of inappropriate automatic fueling, except to direct that fueling be stopped in the event of cell overpressure, as indicated

Photo-composite

by the gauge on the refueling panel. The procedure requires the presence of a cockpit observer, whose only mission is to announce when the desired total is reached.

The manual gives no information concerning fill rates, quantities, and their relationship to a malfunctioning fuel system. The manual also gives no direction to monitor for such symptoms. Though the aircraft NATOPS makes passing reference to the symptoms of stuck fuel-cell valves in the helicopter in-flight refueling procedures, it provides no such caution in the servicing section.

Business as usual, even when done strictly by the book, is not necessarily the safest way of operating. In this case, a "routine" refueling procedure, conducted by the book, still caused almost $100,000 damage to a helo. Had the checklist provided more thorough and relevant data regarding system operation and characteristics, the cockpit monitor might have averted the rupture. How many of his predecessors had noted the unit-of-measure discrepancy and failed to act on it?

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How many pilots have seen a related discrepancy in their NATOPS manual and failed to call for change? We were fortunate to escape this mishap with only bruised egos. The entire episode points out the tremendous value in questioning the "routine" and cultivating a command climate that encourages healthy circumspection.

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